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XRF ANALYSIS OF MORINGA OLIEFERA SEED POWDER

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ABSTRACT

An energy dispersive X-Ray fluorescence method use for measurement of the essential and trace element in medicinal plant Moringa oliefera found in semi arid region of kachchh with a high performance SSD detector. The seed of Moringa oliefera was subjected to Energy Dispersive X- ray Fluorescence (EDXRF) and were analyzed for different mineral composition. As the X- ray fluorescence is one of the most reliable, accurate and non-dispersive technique for the analysis of trace mineral present in the sample using the single press pellet method. During the analysis, it was found that the seed coating layer contains Phosphorus 6.42%, Sulfur 25%, Potassium 20.9%, Calcium 27% and the inner seed contains higher amount of Sulfur 87%, Phosphorous 12.5%, and Chlorine 0.513%. Which were not found mineral element in the Moringa oliefera seed are lead, Titanium, Vanadium, Cobalt, Nickel, Platinum, Arsenic.

Keywords: Energy Dispersive X-Ray Fluorescence (EDXRF) Analysis; Moringa Oliefera; Mineral Element.

I. INTRODUCTION

X-Ray Diffraction spectrometry is an analytical method used to determine chemical composition of solid, powdered, filtered and semi-solid materials.it also useful for determination of thickness and composition of the layer and coating. The XRF method is very useful for chemistry and pharmacy and it is widely applicable for Drugs, Metals, Plants, Polymers, and Plastics. It requires less Sample preparation and easy to use, non-Destructive, requires very less time for analysis, less sample use for sample analysis [1]. Moringa oliefera is a species of Moringaceae family having high Nutritional value and medicinal uses. It is widely grown and rapidly growing tree about 28-30 ft. long and each pod of Moringa oliefera contains 18-24 seed [2-3, 6]. The leaves of Moringa oliefera is a valuable source of macro and micro nutrients and it also contains Beta carotene, Potassium, Calcium, Vitamins, and it is acting as a good source of anti- oxidants[4,5]. Almost each part of moringa oliefera is useful for many purposes like; Domestic cleaning agents, Fertilizer, Biogas, water purification, cropping and hair care products [6, 7]. The Moringa oliefera also acting as an antimicrobial and seed contain higher amount of benzyl isothiocyanate and benzyl glucosinolate is act as an antibiotic agent [9, 10]. The Moringa oliefera seed Aqueous, Ethanolic and Methanolic extract was reduced the level of some enzyme in albino rats and the fact that the Moringa seed are safe for use as medically [11]. The Moringa oliefera seed extract is reduced E.coli count and it also reduced bacteria and efficiently reduced turbidity [12, 13].

Botanical classification of Moringa oliefera [8]:

Kingdom - Plantae

Division – Magnoliophyta

Class - Magnoliopsida

Order – Brassicales

Family - Moringaceae

Genus - Moringa

Species – Oleifera

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(1) Moringa Pod

(2) Pod outer Layer

(3) Pod inner seed

1. EXPERIMENT:

1.1 Sample preparation:

Moringa oliefera pods can be collected from an area of Anjar Kachchh region. The pod is completely dried in sunlight and separated inner and outer layer of pods. Dried at 40 degrees Celsius before grinding. The both part inner seed and outer cover grind separately and converted into fine powder form. With the help of pellet maker make the pellet of two layers of the Moringa oliefera pod.

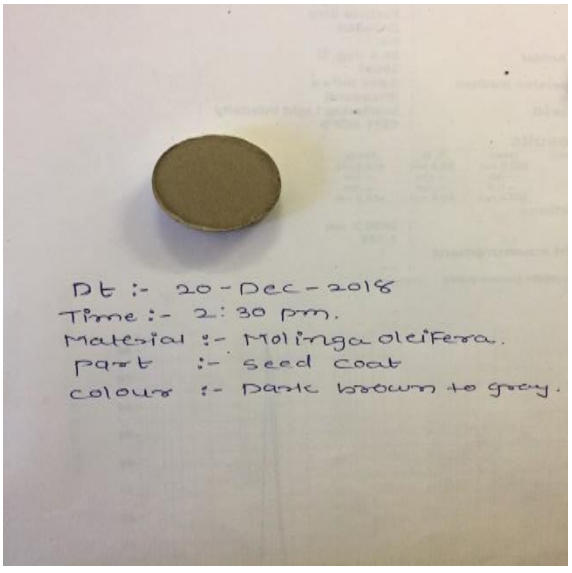

Figure 1: XRF pellet of pod outer layer

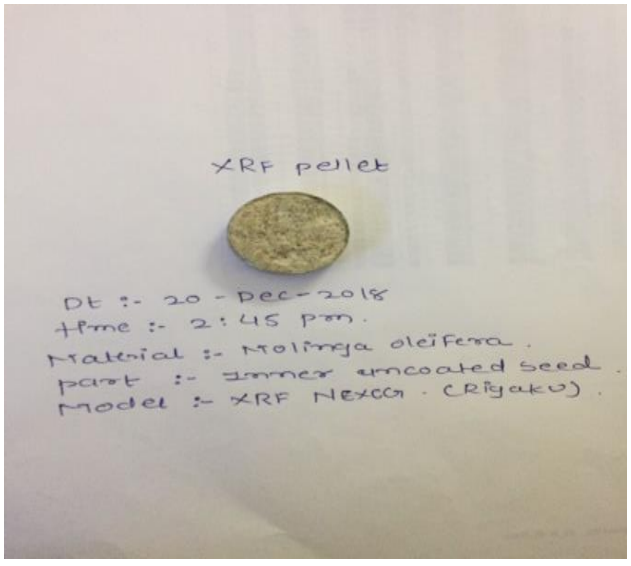

Figure 2: XRF pellet of pod inner layer

1.2 Instrument parameter:

Bench-top Energy Dispersive X-ray Fluorescence (EDXRF) of the make Rigaku elemental analyzer with element range Na to U having Pd anode X ray Tube with high performance SDD detector with the use of NEX CG software.

II. RESULTS AND DISSCUSION

The seed of Moringa oliefera collected from semi-arid region of Kachchh were subjected to-ray Fluorescence instrument for mineral analysis. The present investigation reveals that various mineral ions like were found during the analysis. The outer layer of Moringa oliefera seed contains Calcium 27% , Potassium 20.9%, and Sulfur 25%. Other minerals present are 5.39% Magnesium, 6.42% Phosphorous, Silica 1.35%, Chlorine 1.99%, and Iron 1.37%. And other minerals are present in very less amount which is Copper, Zinc, Strontium,

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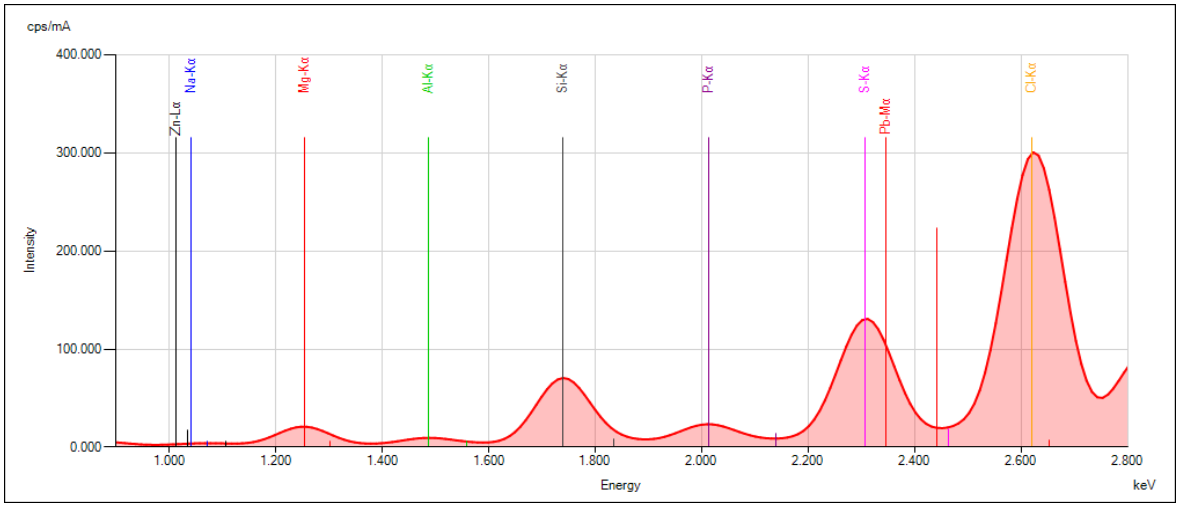
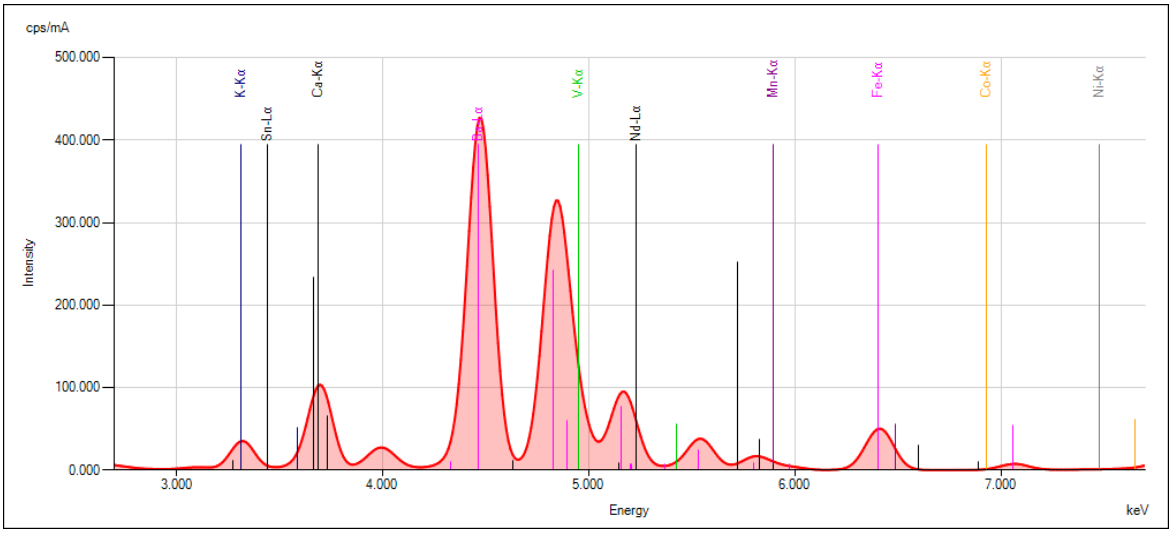
Aluminum, Manganese etc. There is absence of Lead, Arsenic, Titanium, Cobalt and Vanadium. The Moringa oliefera whole plant contains anti-microbial activity and it is also useful for enhancement of cardiac function, rheumatism, venomous bites. It is also useful for inflammation. The Moringa oliefera plant also acts as carminatives, diuretics, and anthelmintic. Seed of Moringa oliefera is applicable as a purgative, antipyretics and anti-inflammatory agents [14].

The inner layer of seed contains a very higher amount of Sulfur 87% and contains 12.5% Phosphorous. Very less amount of 0.513% of Chlorine. There is an absence of other minerals like Potassium, Magnesium, Calcium, Iron, Silica etc. also an absence of Arsenic, Cobalt, Copper, Nickel, Zinc, Lead, Titanium, Vanadium, and Strontium.



1 Graph of XRF analysis of Moringa oliefera seed outer layer



2 Graph of XRF analysis of Moringa oliefera seed outer layer

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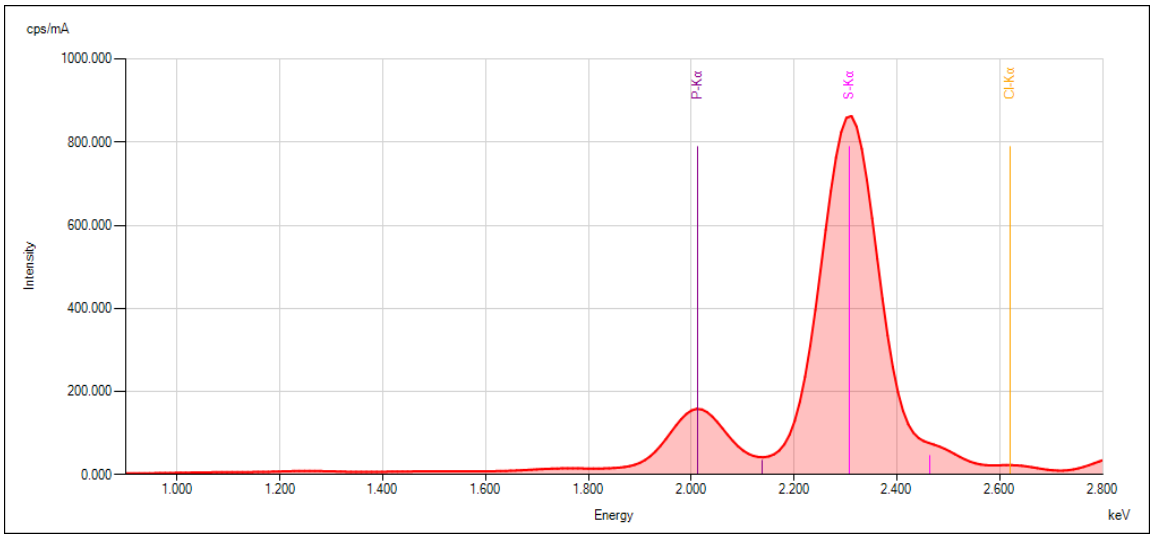
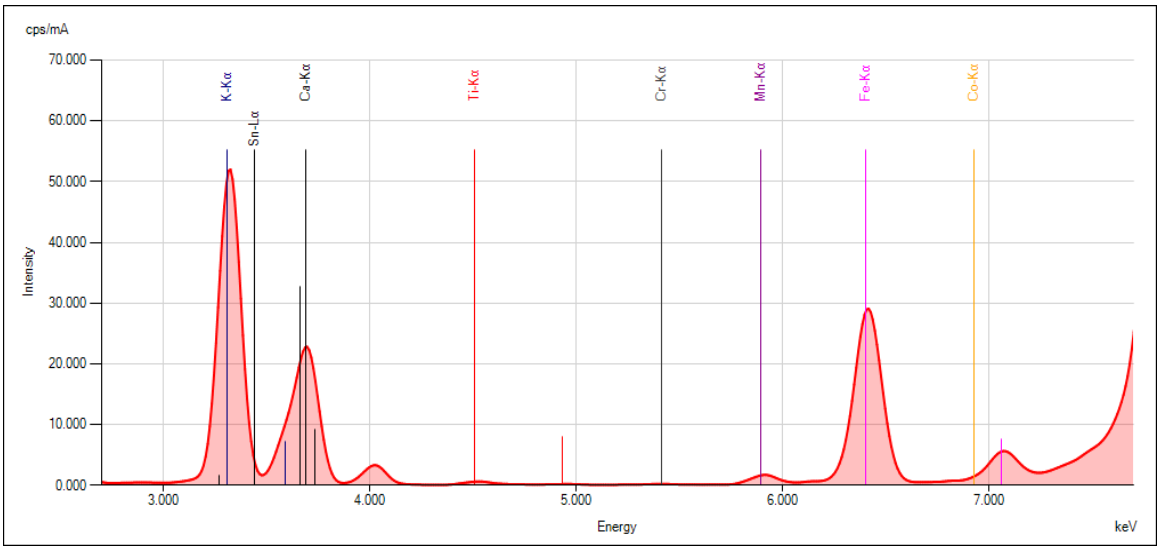


3 Graph of XRF analysis of Moringa oliefera inner seed of pod



4 Graph of XRF analysis of Moringa oliefera inner seed of pod

The mineral ion contents in the Moringa oliefera inner seed and outer layer of pods is listed below:

Sr. No.	Element	%Mass in the outer layer of Pod	%Mass in the inner part of Pod
1	Na	12	ND
2	Mg	5.39	ND
3	Al	0.679	ND
4	Si	1.35	ND
5	P	6.42	12.5
6	S	25	87
7	Cl	1.99	0.513
8	K	20.9	ND
9	Ca	27	ND
10	Ti	ND	ND
11	V	ND	ND

12	Cr	0.0088	ND
13	Mn	0.093	ND
14	Fe	1.37	ND
15	Co	ND	ND
16	Cu	0.134	ND
17	Zn	0.172	ND
18	Br	0.0245	ND
19	Rb	0.034	ND
20	Sr	0.464	ND
21	Sn	0.0952	ND
22	Hf	ND	ND
23	Ta	0.0069	ND
24	Pt	ND	ND
25	Au	0.0028	ND

III. CONCLUSION

The XRF method is very useful, non-destructive, single step analysis and powerful tool for analysis of anions and cations present. In a Moringa oliefera plant found in semi-arid region of Kachchh in Gujarat, India, the major component present is calcium, sulfur, phosphorous, and potassium. The Moringa oliefera has a high medicinal value is due to the presence of high amount of Calcium, Sulfur, Phosphorous, Potassium etc. the Moringa oliefera seed contains high amount of sulfur, which is useful skincare and cosmetic preparation and inner seed contain 87% Sulfur and outer layer of Pod contain 25% Sulfur. It is also useful for joints inflammation and Calcium deficiency in bone and the calcium content in outer layer is 27%. The Magnesium is considered an important constituent of body which is found to be 5.39% in seed of Moringa oliefera. The Phosphorous found in teeth and bones and Moringa oliefera contain 6.42%. Iron is found in seed is 1.32%.Chlorine is outer layer 1.99% and inner seed 0.513%. There is an absence of carcinogenic metals like Arsenic, Lead, Cobalt, Nickel, and Titanium. Traditionally, The Moringa oliefera is widely used for locally medicinal purposes.

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